

WHAT IS CLAIMED IS:

1. An apparatus for producing a straw tube comprising a tube comprising, on an outer circumferential wall thereof, a plurality of grooves extending in a longitudinal direction and a convex streak sandwiched by said grooves, said apparatus comprising:

5 a rotating drum having, on the outer circumferential wall thereof, a plurality of tube loading grooves into which tubes are loaded and which extend in an axial direction, a female rod capable of being inserted into or drawn out from a tube within the tube loading groove by reciprocation of a cam mechanism and having a plurality of grooves formed at a position corresponding to a surface of a  
10 tube exposed from the tube loading groove, and a male roller having a male mold which has convex streaks corresponding to the grooves of said female rod provided at a plurality of positions on the circumferential wall,

wherein said male roller is disposed such that the grooves of said female rod and the convex streaks of the male roller engage through a tube and wherein  
15 said female rod and the male roller are synchronized.

2. The apparatus for producing a straw tube as claimed in claim 1, wherein said female rod has two grooves and the male mold provided on said male roller has two convex streaks.

3. A method for producing a straw tube comprising a tube comprising on an outer circumferential wall thereof, a plurality of grooves extending in a longitudinal direction and a convex streak sandwiched by these grooves, said method comprising:

5 a step of loading a tube into a tube loading groove formed on the outer circumferential wall of a rotating drum and extending in an axial direction thereof,

a step of inserting into said tube a female rod having a plurality of grooves formed at a position corresponding to a surface of the tube exposed from said  
10 tube loading grooves, and

a step of engaging the grooves of the female rod within the tube and convex streaks of a male mold provided on a male roller, through the tube.

4. The method for producing a straw tube as claimed in claim 3, wherein said female rod has two grooves and the male mold provided on said male roller has two convex streaks.

5 5. The apparatus for producing a straw tube as claimed in claim 1, wherein said convex streak projects outward from a datum level of the outer circumferential wall.

10 6. The apparatus for producing a straw tube as claimed in claim 1, wherein said tube comprises a cylindrical tube body where said grooves and said convex streak are not formed,

each of said grooves and convex streak has a length of  $1/3$  to  $3/4$  the tube,

each of said grooves is deeper than a surface of the outer circumferential wall of the tube body, and

15 said convex streak projects outward from the surface of the outer circumferential wall of the tube body.

20 7. The apparatus for producing a straw tube as claimed in claim 1, wherein said apparatus comprises a heating device for heating the tube within the tube loading groove.

25 8. An apparatus for producing a multi-stage straw tube comprising an inner tube and an outermost tube comprising, on an outer circumferential wall thereof, a plurality of grooves extending in a longitudinal direction and a convex streak sandwiched by said grooves,

said apparatus comprising

a tube forming device for forming an annular inner tube and an outermost tube,

30 an outermost tube processing device for forming a groove and a convex streak on the outermost tube, and

an assembling device for combining the inner tube and the outermost tube,

said outermost tube processing device comprising

a rotating drum having, on the outer circumferential wall thereof, a plurality of tube loading grooves into which tubes are loaded and which extend in an axial direction, a female rod capable of being inserted into or drawn out from a tube within the tube loading groove by reciprocation of a cam mechanism and having a plurality of grooves formed at a position corresponding to a surface of a tube exposed from the tube loading groove, and a male roller having a male mold which has convex streaks corresponding to the grooves of said female rod provided at a plurality of positions on the circumferential wall,

wherein said male roller is disposed such that the grooves of said female rod and the convex streaks of the male roller engage through a tube and wherein said female rod and the male roller are synchronized.

9. The method for producing a straw tube as claimed in claim 3, wherein said convex streak projects outward from a datum level of the outer circumferential wall.

10. The method for producing a straw tube as claimed in claim 3, wherein each of said grooves and convex streak has a length of  $1/3$  to  $3/4$  the tube,

each of said grooves is deeper than a surface of the outer circumferential wall of the tube body, and

said convex streak projects outward from the surface of the outer circumferential wall of the tube body.

11. The method for producing a straw tube as claimed in claim 3, wherein said method comprises a step of heating the tube within the tube loading groove.

12. A method for producing a multi-stage straw tube comprising an inner tube and an outermost tube on an outer circumferential wall thereof, a plurality of grooves extending in a longitudinal direction and a convex streak sandwiched by these grooves,

said method comprising:

a step of forming an annular inner tube and an outermost tube,

a step of forming a groove and a convex streak on the outermost tube, and  
a step of combining the inner tube and the outermost tube,

70        said step of forming a groove and a convex streak on the outermost tube  
comprising:

         a step of loading a tube into a tube loading groove formed on the outer  
circumferential wall of a rotating drum and extending in an axial direction  
thereof,

75        a step of inserting into said tube a female rod having a plurality of grooves  
formed at a position corresponding to a surface of the tube exposed from said  
tube loading grooves, and

         a step of engaging the grooves of the female rod within the tube and  
convex streaks of a male mold provided on a male roller, through the tube.

80